

### REMARKS

The claims in the application remain 91-115.

Favorable reconsideration of the application is respectfully requested.

Claims 91-96, 99, 108 and 111-115 have now been rejected under 35 U.S.C. §103 as obvious over Christensen et al in view of Barrer et al (J. Chem. Soc. (A), 1970, pp. 2735-2745) in paragraph 5 of the Office Action.

It is contended it would have been obvious for a person skilled in the art to produce a Zeolite N "of the type disclosed by Christensen [et al]" where the Si:Al ratio is not 1:1 since Barrer et al allegedly disclose Zeolite N material having a non 1:1 ratio of these elements. It is also asserted disclosure in Barrer et al of best results being achieved with a ratio of  $\text{SiO}_2:\text{Al}_2\text{O}_3$  in the range of 2-3, provides the requisite motivation for such modification.

Disclosure of the single Zeolite N of Christensen et al has been addressed in detail in the previously-filed Responses and will be briefly addressed here. The Zeolite N of Christensen et al represents one point in chemical space defined by the specific conditions used to achieve the synthesis. Apart from the variations in the composition of the produced Zeolite N from those presently claimed, and which have been acknowledged by the Examiner, the process of Christensen et al requires very high temperatures and 7 days to form their Zeolite N, in strong contrast to the present, simpler, safer and thus more advantageous conditions being temperatures of less than 100°C and a reaction time of around 6 hours.

In terms of the disclosure in Barrer et al, it is contended Barrer et al teach "*the best results are achieved when a ratio of  $\text{SiO}_2:\text{Al}_2\text{O}_3$  is in the range of 2-3;*" however, Barrer et al simply indicate a *preferred* starting material for the synthesis is an aluminosilicate with a ratio of  $\text{SiO}_2:\text{Al}_2\text{O}_3$  which is 2 or 3. Barrer et al attribute this to the similarities between Zeolite N and K-F Zeolites which have a ratio of  $\text{SiO}_2:\text{Al}_2\text{O}_3$  of 2. Therefore, Barrer et al reason employing a starting material having the above ratio which is close to that found in the K-F Zeolite product, will improve the likelihood of producing a Zeolite N.

However, Barrer et al, as Christensen et al, only disclose the structure of a single Zeolite N. This is the formula given in Table 11, page 2744, for "K-F(Cl)" which has been rewritten by the Examiner in the Office Action as  $\text{K}_{12}(\text{Al}_{0.88}\text{Si}_{1.13})_{10}\text{O}_{40}\text{Cl}_{3.1}2.44\text{H}_2\text{O}$  (resulting in a Si:Al ratio of approximately 1.28). It is important to recognize the *limitations* of Barrer et al's teaching in that the text underneath Table 11 states that "*In all analyses only  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ , halides and  $\text{H}_2\text{O}$  were determined* [emphasis added]" and "*For salt-bearing K-F the number of moles of  $\text{K}_2\text{O}$  was assumed to be equivalent to the  $\text{Al}_2\text{O}_3$*  [emphasis added]." The reference to "salt-bearing K-F" is a reference to the structural similarity of K-F Zeolites with bromo, iodo and chloro equivalents e.g. Zeolite N which is occasionally referred to in the paper as a K-F (Cl) Zeolite. Thus the structure of even the single Zeolite N disclosed by Barrer et al is uncertain and based upon an assumption of equivalence, rather than actual empirical data. No further examples from the syntheses outlined in Barrer et al were analyzed and so this remains the single disclosure of a *possible* Zeolite N (assuming the structure to actually be correct).

When considering the differences between the prior art and the claimed invention, it is a proper approach to ask the question whether the claimed invention as a whole would have been obvious to one skilled in the art at the relevant time, as opposed to asking whether the *perceived* differences between the two would have been obvious (*MPEP* § 2141.02.I). Accordingly, it is respectfully submitted the present focus on identifying prior art which teaches a single Zeolite N material having a Si:Al ratio greater than 1.0 may be synthesized and holding this teaching in combination with the Christensen et al prior art renders the presently claimed invention obvious, is a *flawed* approach which is tainted by and a result of knowledge of the present invention, i.e., constitutes improper hindsight reconstruction of the present invention. This approach is entirely the result of an attempt to avoid the proviso in present Claim 1 which excludes the single Zeolite N product of Christensen et al and does not take into consideration the present invention as a whole.

A range of Zeolite N has been synthesized and demonstrated in the present application, and the finding of a single Zeolite N with a Si:Al greater than 1.0 does not in any way render that material as obvious in combination with Christensen et al. Further, each prior art reference must also be considered in its entirety (*MPEP* § 2141.02.VI), including portions that would lead away from the claimed invention. The Examiner has chosen to focus on the Si:Al aspect of Barrer et al while ignoring the single Zeolite N formula of Barrer et al has a relative Cl content of 3.1. The presently claimed Zeolite N has a maximum relative halide content of 2.0 (when d = 0). Thus, the teaching of Barrer et al is a Si:Al of greater than 1.0 was achieved in combination with a relative chloro content of 3.1

and there has been no reasoning presented why one skilled in the art would assume such a ratio could be maintained while, at the same time, achieving the chloro content found in the Zeolite N of Christensen et al.

This leads to the issue of predictability. As is set out in *MPEPS* 2143.01.III, "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art." The contention it *would* have been obvious to produce a Christensen et al-type Zeolite N with a c/b which is not one, as shown in Barrer et al, improperly ignores the bulk of the teaching in Barrer et al regarding the *lack* of predictability in this field.

It is important to note the Zeolite 4A starting material of Christensen et al ( $\text{Na}_{12}\text{Al}_{12}\text{Si}_{12}\text{O}_{48} \cdot 27\text{H}_2\text{O}$ ) and the Linde sieve X starting material of Barrer et al ( $\text{Na}_{12}\text{Al}_{12}\text{Si}_{16}\text{O}_{56} \cdot 36\text{H}_2\text{O}$  when rewritten in the form of Christensen et al's starting material) are chemically different materials. The Examiner contends the teaching of achieving the Zeolite N of Barrer having a c/b greater than 1.0 produced from the above starting material could be translated and applied to the starting material of Christensen et al, in a predictably successful manner, to produce a Zeolite N within the present claims. However, this is in direct contrast to the teaching of Barrer et al that it is *extremely* difficult to produce Zeolite N material and the results achieved vary *widely* and *unpredictably*, depending upon (i) the chosen starting material and (ii) the synthetic conditions employed. For example, at page 2741, column 2, penultimate paragraph of Barrer et al, it is stated that "*The hydrothermal recrystallisation of analcite with potassium bromide or chloride is more difficult than with the corresponding barium halides.*" Further, most of page 2742, including

Table 7, of Barrer et al is devoted to setting out the difficulties faced with producing Zeolite N material. In attempting to synthesize material starting from gels, Barrer et al state "At 100°C the salt-bearing phases N and O resembling K-F were poorly crystallised (page 2741, column 1, last paragraph)."

Importantly, in terms of the predictability of making modifications to the approach of Barrer et al which provided the single Zeolite N product identified, the second column on page 2742 sets out that "*Under the conditions found best with Na-X, Linde Sieve Na-A gave with KCl and KBr a mixture of the phases resembling K-F with kaliophillite and with KI gave pure kaliophillite. The mixture of phases like K-F and of kaliophillite was also obtained with KCl and KBr from sodalite at 200°C.*" Barrer et al thus makes clear even a small change in starting material to an analogous material, i.e. a change from Linde Sieve Na-X to Linde Sieve Na-A, can completely change the results obtained to afford a mixture of different phase products. In light of this evidence explicitly recited in Barrer et al, an argument of predictability when altering the starting material of Christensen et al, as suggested by the Examiner, cannot possibly be maintained. Other examples of failed attempts to synthesize Zeolite N material are presented by Barrer et al, highlighting the lack of predictability in this field.

On a related point, given the results when synthesizing Zeolite N material are highly variable and condition dependent, the Examiner has not stated what the conditions employed in the suggested modified procedure of Christensen et al would be. Christensen et al employ temperatures of 300°C for 170 h under pressure. The Zeolite N of Barrer et al for which a formula was presented was synthesized at 260°C for 4 days (page 2742,

second column, penultimate paragraph). Given the variation in products described by Barrer et al depending on the temperature used, it is simply impossible to predict with any degree of confidence the higher temperature of Christensen et al would work with what would presumably need to be some form of hybrid starting material which has also not been detailed by the Examiner.

To summarize, it is respectfully submitted the approach taken by the Examiner, at most, constitutes hindsight reconstruction with knowledge of the present invention and ignores the difficulties associated with production of Zeolite N material. Each of the prior art references discloses only a single Zeolite N structure and to suggest that the different approaches to the final material taken within these references would simply be combined by one skilled in the art goes against the teaching of at least the Barrer et al document which, at some length, details the associated difficulties and lack of predictability in the field.

The present Zeolite N material has been produced by a process which is less time intensive and requires less energy, is safer due to the lower temperatures and has greater predictability. This approach defined in the present claims is not suggested by the approach of Christensen et al or Barrer et al and there is no suggestion within either reference it would be possible to do so. A combination of these references, in addition to the deficiencies discussed above, has also not been shown to suggest to this chemical approach.

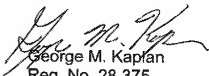
Accordingly, it is respectfully requested the obviousness rejection based upon Christensen et al in view of Barrer et al be withdrawn. Again, Barrer et al strongly contradicts any suggestion modification to an aluminosilicate starting material and/or

process conditions, could produce a specifically-desired Zeolite N with the requisite degree of predictability.

The requisite fee for a one-month extension of time for response under 37 C.F.R. §1.136(a) is enclosed.

Early favorable action is earnestly solicited.

Respectfully submitted,

  
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